Modified vegetation indices for Ganoderma disease detection in oil palm from field spectroradiometer data

ABSTRACT

High resolution field spectroradiometers are important for spectral analysis and mobile inspection of vegetation disease. The biggest challenges in using this technology for automated vegetation disease detection are in spectral signatures pre-processing, band selection and generating reflectance indices to improve the ability of hyperspectral data for early detection of disease. In this paper, new indices for oil palm Ganoderma disease detection were generated using band ratio and different band combination techniques. Unsupervised clustering method was used to cluster the values of each class resultant from each index. The wellness of band combinations was assessed by using Optimum Index Factor (OIF) while cluster validation was executed using Average Silhouette Width (ASW). 11 modified reflectance indices were generated in this study and the indices were ranked according to the values of their ASW. These modified indices were also compared to several existing and new indices. The results showed that the combination of spectral values at 610.5nm and 738nm was the best for clustering the three classes of infection levels in the determination of the best spectral index for early detection of Ganoderma disease.